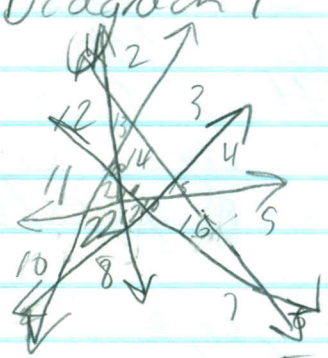
P.O.W. Week 6 10/10

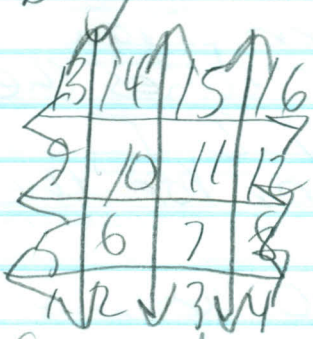
Noah Lapsley 11/14/10 Period 6

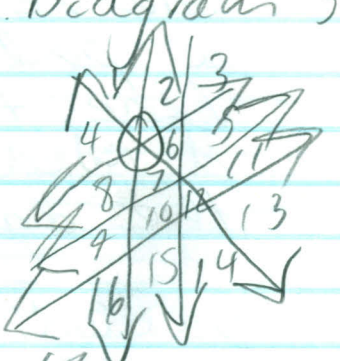
Problem statement:
What is the maximum number of non-overlapping regions into which you could divide the plane using six lines? What is the maximum number of regions with n lines?

Process:
For 1st Question
First, I tried this one way and got 20 regions. Then, I tried setting up another one again and noticed there were more regions the second way. I noticed that you could find more regions if all of the lines intersected with eachother and that three lines didn't intersect at one point, you could find more regions (diagram 1), than some of them not intersecting (diagram 2) or some three lines intersecting in one point.

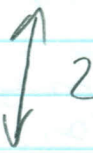
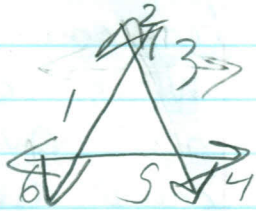
Diagram 1 Diagram 2 Diagram 3

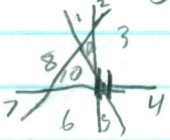
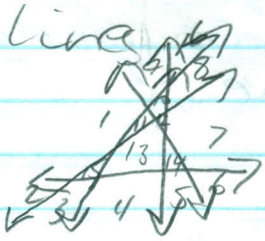






The way I figured out the answer to the first question was make diagrams for 0, 1, 2, 3, 4 & 5 lines. You can see them on the next page →

0 lines	1 line	2 lines	3 lines
1 region			

4 lines	5 lines
	

I took this new info. and made a chart.

Lines	Regions
0	1
1	2
2	4
3	7
4	11
5	16
6	22
7	29
8	37

I was able to fill in the rest of the regions because I figured out a pattern, you add 1 to # of lines + 1 times the # of lines a gach divided by 2, I used this to get the answer for the 2nd question

Solution: The answer to the 1st question is 22. This is correct because you can check my work and do it the way I explained it. This is complete because it asked for the max # of regions for 6 lines and I found it. →

The answer to the 2nd question is: (n being the # of lines) $[1+[n(n+1)/2]]$. This answer is correct because you can put any any number of lines on it and you will get the same # as if you were to draw it out. This answer is correct because it asked for how many regions n lines would have and I found it.

Evaluation:
This was yet again an easier problem even though it called for some higher powered thinking. Overall, it was a very fun problem to solve.